

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Original) In an atomic force microscopy (AFM) system including a cantilever with a tip used to analyze a sample, the AFM outputting an AFM data file, a computer readable medium storing computer readable program code for causing a computer to perform the steps of:
  - a) receiving user input regarding an analysis to be performed and analysis parameters;
  - b) parsing the AFM data file based on the user input to obtain a deflection of the cantilever;
  - c) determining an indentation depth of the tip into the sample based at least in part on the deflection;
  - d) selecting a model of contact mechanics based on the user input;
  - e) solving the selected model of contact mechanics based on the input analysis using the determined indentation depth; and
  - f) determining and reducing a residual error.
2. (Original) A computer readable medium of claim 1, further comprising computer readable program code for causing a computer to perform the step of displaying results of the analysis to a user.
3. (Original) A computer readable medium of claim 1, wherein the analysis parameters comprise at least one of a tip shape, a spring constant, a tip radius, a vertex inclination, and a cone angle.
4. (Original) A computer readable medium of claim 1, wherein the determining the indentation depth comprises:
  - estimating an initial contact point;

determining data points of an ideal curve that extends from the estimated initial contact point; and

determining a difference between the data points comprising the ideal curve and the deflection of the cantilever.

5. (Original) A computer readable medium of claim 4, wherein the estimating step comprises:

reading data points from the AFM data file in a serial manner;

continuously calculating a mean of the data points as the data points are read;

continuously calculating a standard deviation for the data points as the data points are read;

and

finding a first occurrence of a predetermined number of data points that exceed or are exceeded by the current mean by a predetermined number of standard deviations.

6. (Original) A computer readable medium of claim 5, further comprising computer readable program code for causing a computer to perform the step of receiving the predetermined number of data points and the predetermined number of standard deviations as user input.

7. (Original) A computer readable medium of claim 1, further comprising fitting the indentation depths using a nonlinear algorithm to the selected model of contact mechanics.

8. (Original) A computer readable medium of claim 1, wherein the selected model of contact mechanics is one of a Hertz, Bilodeau, and Sneddon model.

9. (Original) A computer readable medium of claim 1, wherein determining the residual error comprises determining a difference between the measured indentation depths and indentation depths resulting from the solved model of contact mechanics.

10. (Original) A computer readable medium of claim 1, further comprising computer readable program code for causing a computer to perform the step of reducing the residual error.

11. (Original) A computer readable medium of claim 10, wherein reducing the residual error comprises:

- selecting at least one new initial contact point;
- repeating c) - f) using the new initial contact point; and
- comparing the residual errors; and
- selecting the initial contact point with the lowest residual error.

12. (Currently Amended) ~~In an atomic force microscopy (AFM) system including a cantilever with a tip used to analyze a sample, the AFM outputting an AFM data file, a computer readable medium storing~~ A computer readable medium of claim 1, further comprising computer readable program code for causing a computer to perform the steps of:

- presenting an option GUI to a user;
- receiving ~~test~~ the analysis parameters from the user via the GUI;
- reading ~~an~~ the AFM data file based on the input ~~test~~ analysis parameters;
- plotting a graph of the deflection of or force on the cantilever versus a position of the cantilever in a second GUI;
- presenting in the second GUI a first user actuated interface for initiating an analysis; and
- performing an elasticity analysis of the data file based on the input analysis parameters in response to actuation of the first user actuated interface.

13. (Original) A computer readable medium of claim 12, further comprising computer readable program code for causing a computer to perform the steps of:

- presenting in the second GUI a second user actuated interface for modifying a region of interest function;
- presenting in the second GUI a third user actuated interface for data smoothing function;
- presenting in the second GUI a fourth user actuated interface for a curve rotation function.

14. (Original) A computer readable medium of claim 13, further comprising computer readable program code for causing a computer to perform the steps of:

modifying the region of interest in response to actuation of the second user actuated interface;

performing the data smoothing function interest in response to actuation of the third user actuated interface; and

performing the curve rotation function interest in response to actuation of the fourth user actuated interface.

15. (Original) A computer readable medium of claim 12, further comprising computer readable program code for causing a computer to perform the step of displaying at least one of a confidence interval graph, a squared error graph, an elasticity graph, and an elasticity/error graph.

16. (Original) A computer readable medium of claim 12, further comprising computer readable program code for causing a computer to perform the step of formatting results of the analysis into a text file.

17. (Original) A computer readable medium of claim 16, further comprising computer readable program code for causing a computer to perform the step of displaying the text file to the user.

18. (Original) A computer readable medium of claim 12, further comprising computer readable program code for causing a computer to perform the step of formatting the results of the analysis into a spreadsheet format.

19. (Original) A computer readable medium of claim 18, further comprising computer readable program code for causing a computer to perform the step of associating each parameter and the results of the analysis with a predetermined field.

20. (Original) A computer readable medium of claim 18, further comprising computer readable program code for causing a computer to perform the steps of:  
creating a thumbnail view of a data curve for the analysis; and  
storing the thumbnail view with the results.

21. (Original) A system for gathering and analyzing data, comprising:  
an atomic force microscopy (AFM) system including a cantilever with a tip used to analyze a sample, the AFM outputting an AFM data file;  
a memory for storing the AFM data file and in communication with the AFM;  
a computer to read the AFM data file from the memory;  
a display coupled to the computer for displaying output from the computer;  
input means coupled to the computer to receive user input;  
means for parsing the AFM data file based on the user input to obtain a deflection of the cantilever;  
means for determining an indentation depth of the tip into the sample based at least in part on the deflection;  
means for selecting a model of contact mechanics based on the user input; and  
means for solving the selected model of contact mechanics using the determined indentation depth to obtain a result.

22. (Original) The system of claim 21, further comprising means for reducing a residual error in the result.

23. (Original) The system of claim 21, further comprising means for formatting results of the analysis into a text file.

24. (Original) The system of claim 21, further comprising means for formatting the results of the analysis into a spreadsheet format.

25. (Original) The system of claim 21, further comprising:
- means for plotting a graph of the deflection of the cantilever versus a position of the cantilever in a second GUI; and
  - means for presenting in the second GUI a first user actuated interface for initiating an analysis.